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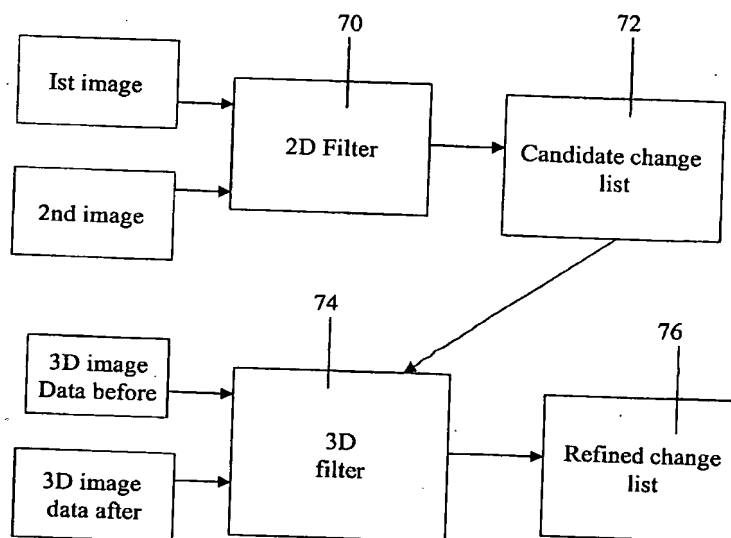
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[Continued on next page]

(54) Title: **AUTOMATIC PROCESSING OF AERIAL IMAGES**



(57) Abstract: Change detection apparatus for detection of changes between first and second stereoscopic image pairs obtained at different times of a substantially similar view, comprises: a two-dimensional image filter (70) for comparing first and second image pairs to obtain an initial list of change candidates (72) from two-dimensional information in the image pairs, and a three-dimensional image filter (74) for comparing the image pairs at locations of the change candidates using three-dimensional image information. The apparatus retains those change candidates correlating with three-dimensional image change and rejects change candidates not correlating with three-dimensional image change, and produces a refined list of change candidates.(76)



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL04/00263

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06K 9/00

US CL : 382/154

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 33/1A; 348/47, 117, 144; 359/462; 382/103, 106, 113, 154, 219, 294; 396/9, 10;

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST (US Patents, Derwent, JPO, EPO, IBM), IEEE, ACM

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,353,678 B1 (GUO et al.) 05 March 2002, figure 2.	7
A	US 6,049,619 A (ANANDAN et al.) 11 April 2000, figure 2.	7

☐ Further documents are listed in the continuation of Box C.



See patent family annex.

Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL04/00263

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-7

- Remark on Protest
- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL04/00263

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1, 7, 8, 9, 10, 11, 13, 14, 15 and 17, drawn to the detection of changes between images and subsequent verification of those changes (e.g., confirming or eliminating candidate changes).

Group II, claim(s) 18 and 30, drawn to registering aerial photos using cross-correlation.

Group III, claim(s) 42 and 49, drawn to classifying tie points (i.e., points on images used to register them) as either stable or unstable.

The inventions listed as Groups I - III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Inventions II and III do not recite the special technical feature of confirming/eliminating candidate changes recited in invention I. Likewise, invention III does not recite the special technical feature of registering aerial photos using cross-correlation as recited in invention II.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

Species 1, defined by claim 1.

Species 2, defined by claims 8 and 9.

Species 3, defined by claims 10 and 11.

Species 4, defined by claims 13 and 14.

Species 5, defined by claims 15 and 17.

The following claim(s) are generic: 7.

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: Each of the above species utilize mutually exclusive techniques to validate candidate changes.